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RESEARCH LETTER

Communicating public health data clearly: lessons from COVID-19

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ABSTRACT

Effectively communicating data to a broad range of audiences plays an important role in public health. The COVID-19 pandemic showed how in times of public health crises, people seek out data. Because of this emerging broad interest in public health data, the accessibility and usability of data visualizations and data communication products are critical to reaching not only public health professionals but others, too. At the New York City Department of Health and Mental Hygiene, we've worked to make public health data comprehensible and actionable through an approach that features user-centered design, and incorporates health literacy principles. Key strategies include conducting research with users to understand their needs, ensuring usability in web-based products, and designing data visualization products to be easily understood by both experts and general audience. Explanatory data products, which highlight key insights, play a crucial role in making data accessible. As public health crises continue to demand clear and transparent information sharing, we advocate for a sustained commitment to user-centered design in public health data communication, ensuring that data is not only available but also truly accessible and useful to the public.

KEYWORDS

Public health; data visualization; web usability; user-centered design; user research; health literacy; health communication; data communication

Introduction

A remarkable feature of the COVID-19 pandemic was public attention to public health data. As case counts and epi curves reached the general public, dashboards became 'the most striking cultural artifact of the pandemic' [1]. Dashboard development surged worldwide [2] in response to an increased demand for ways to provide insight into the pandemic [3]. It's not unreasonable to suggest that during the pandemic, more eyes were on public health data visualizations than at any other time in history.

A few months into the pandemic, Rima Rudd and Cynthis Bauer published 'Health literacy and early insights during a pandemic' in this journal [4]. They pointed out that the pandemic exposed the public to charts and numbers in new ways, in an environment characterized by the accumulation of data and attention to public health concepts. Rudd and Bauer wrote that unclear information 'stymies the flow of knowledge and inhibits action,' and that in this new information environment, clearly communicating insights is what makes the difference between making data *available* and making it *accessible*.

At the New York City Department of Health and Mental Hygiene (DOHMH), we have observed major interest in public health data during significant events, like COVID-19 [5] and wildfire smoke events [6]. Because of this, we have developed effective data communication products that make data accessible and comprehensible, like the Environment and Health Data Portal (https://a816-dohbesp.nyc.gov/IndicatorPublic/), consistent with Rudd and Bauer's call. To apply a health literacy lens to data communication, we conduct research with our users to understand their needs, preferences, and pain points; develop material that meets user needs; and iteratively revise older material to continually improve it.

In this letter, we outline observations from this work, and we argue for ongoing attention to effective data communication practices that make public health data more accessible and useful to more people.

Our lessons learned

Designing data for everyone

In today's world, data are not the exclusive domain of experts – they're part of common conversation. Ordinary New Yorkers seek data, especially during crises. For example, early in the COVID-19 pandemic, web traffic to the DOHMH website was 10 times higher than normal, with over half going to COVID-19 data dashboards pages [5].

While it's widely understood that data can support policy-making [7], our user research has shown that non-policymakers are interested in using data to understand or access further health messages and resources. Accordingly, we believe that data can reassure the public that the government is monitoring crises and communicating openly, build trust, and help the uptake of health and behavioral messages [8].

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To build trust and support messaging, it's important to design data for everyone – not just for professionals. A focus on evidence-based data visualization techniques, storytelling, and plain language can help make data dashboards accessible to both lay users and power users.

Usability is a key construct – but content matters

In our user research, we often hear both data professionals and lay users say that any web data product 'has to be user-friendly' [6]. Research shows that in web systems, usability is a key construct that spells the difference between making data available and making it accessible [9]. Publishing data isn't effective if people cannot find it on a website, navigate it effectively, or understand it.

Even a highly usable system depends on the quality (or perceived quality) of its material within it. As usable systems allow people to engage with content more closely, users may be more critical of it: we have observed users frustrated by a lack of data on specific topics of interest, or by the multiyear data lags common in health surveillance systems. Having high-quality content includes providing clarity and transparency around things like why we publish the data we publish and what users can expect of datasets.

Explanatory techniques are vital

Rudd and Bauer point out that 'for some, numbers … carry persuasive power. For others, numbers … sow confusion.' In our user research, we have found that both professionals and lay audiences appreciate data products that *clearly deliver the findings in the data*.

We categorize our data products as being either exploratory (allowing people to browse datasets in search of data points, or in search of one of many possible stories), or explanatory (focused on highlighting key findings and stories in a dataset). Explanatory products – which explain why data were collected, why they are shared, and what the key findings are – are vital complements to exploratory products. Clearly articulating data interpretations, nuances, and conclusions makes data more accessible to more people.

Tailoring helps

It's important to consider why users are seeking data, what they're asking, and how they will use data. Some users, like data or policy professionals, often have a topic-based inquiry, asking something like, 'Where is asthma the worst?'. A map of data helps answer this question.

But other users may have a primarily location-based inquiry, asking, 'What's affecting my neighborhood – and why?'. In this case, a rundown of many indicators for a chosen neighborhood might be most useful.

Tailoring information presentations for different use cases can mean offering the same data in different presentations or formats, using a variety of data communication tools or formats. This ensures that we offer data that answer users' top questions with less friction, without requiring them to manipulate data.

Actionability is crucial

Our users often tell us that when they're looking at data that identifies a problem, they want to know what can be done about it. This action may take many forms: perform a specific health behavior, access protective resources, or even contact elected officials or advocate for change. Using data to attract people and then connect them to this next step can be powerful. Not offering these follow-up steps can frustrate and disempower data users.

User research is an invaluable guide

To understand what constitutes a usable product, what content people want, or how best to tailor content for audiences, there is no substitute for user research. We've found value in user research activities that range from simple surveys, to guided one-on-one sessions in which we watch users navigate data products, to quantitative usability assessments. User research can identify issues that we cannot anticipate. When we are not learning from actual users about how best to meet their needs, we're guessing.

Challenges in knowledge and in practice

Creating usable data communication products requires that government public health agencies have the capacity for data visualization and communication, web development and usability, and user research and user-centered design. Modern design methods that feature user-centered, iterative practices are shown to add value in public health settings [10]. Without in-house capacity for this work, government agencies may contract for this work, which lengthens timelines and can add risk. Best practices are to support innovative teams, work iteratively, and build on successes. Cross-functional, interdisciplinary teams with expertise in data, content, communications, and digital tools can collaborate to build robust, reliable, maintainable, and effective government digital products [11].

Where do we go from here?

Creating websites that effectively communicate public health data is a national priority; the Office of Disease

Prevention and Health Promotion has an objective to increase the proportion of public health websites that follow established usability principles [12].

To build on lessons learned from the COVID-19 pandemic, public health agencies should expand their capacity for data communication so that more people have more ways to access, understand, and use surveillance data to improve health. To apply the health literacy lens to data communications, agencies can leverage existing material to develop products that emphasize usability and explanation [13–15]. We should conduct research with users to inform priorities and strategies, understand users' needs and pain points, test material for effectiveness, and iterate to continually improve. Additionally, public health research should examine data visualization 'as an intervention that informs and can modify behavior, from individual choices to larger public health policy' [16].

The lessons that Rudd and Bauer identified early in the COVID-19 pandemic were only reinforced as the crisis continued and remain applicable today. Public health agencies should heed these lessons; data are a vital asset that must be communicated broadly and clearly to be effective, and to have the greatest potential of influencing health and policy.

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Notes on contributor

Matthew Montesano, MPH has 15 years of experience managing data communication projects for public health agencies. Montesano manages the Environment and Health Data Portal and supports the development of products that make data easier to access, understand, and use so that public health knowledge can better influence policy and improve health. Montesano led the work described in this submission and wrote the letter.

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